

A₁ have gears, belts and pulleys driven so that the parallelogram linkage can be contracted and extended.

Paragraph beginning at page 2, line 7 has been amended as follows:

A₂ According to the first aspect of the present invention there is provided a robot arm mechanism comprising: a handling member for supporting and handling an object; a robot arm connected to the handling member, the robot arm comprising a first arm link having first and second end portions, a second arm link having first and second end portions, and a link retaining mechanism having a center line, the link retaining mechanism pivotably retaining the first and second arm links respectively at the first end portions of the first and second arm links and keeping parallel two lines including a line passing through the first and second portions of the first arm link and a line symmetrical with respect to the center line with the line passing through the first and second portions of the second arm link, the link retaining mechanism comprising a first joint cross linkage including a first short link having first and second end portions, a first long link having first and second end portions and longer than the first short link of the first joint cross linkage of the link retaining mechanism, the first short and long links of the first joint cross linkage of the link retaining mechanism pivotably connected with each other at the second end portion of the first short link of the first joint cross linkage of the link retaining mechanism and the first end portion of the first long link of the first joint cross linkage of the link retaining mechanism, a second short link having first and second end portions and substantially equal in length to the first short link of the first joint cross linkage of the link retaining mechanism, the first long link of the first joint cross linkage of the link retaining mechanism and the second short link of the first joint cross linkage of the link retaining mechanism pivotably connected with each other at the second end portion of the first long link of the first joint cross linkage of the link retaining mechanism and the first end portion of the second short link of the first joint cross linkage of the link retaining mechanism, and a second long link having first and second end portions and substantially equal in length to the first long link of the first joint cross linkage of the link retaining mechanism, the second short and long links of the first joint cross linkage of the link retaining mechanism pivotably connected with each other at the second end portion of the second short link of the first joint cross linkage of the link retaining mechanism and the first

end portion of the second long link of the first joint cross linkage of the link retaining mechanism, the second long link of the first joint cross linkage of the link retaining mechanism and the first short link of the first joint cross linkage of the link retaining mechanism pivotably connected with each other at the second end portion of the second long link of the first joint cross linkage of the link retaining mechanism and the first end portion of the first short link of the first joint cross linkage of the link retaining mechanism under the state that the second long link of the first joint cross linkage of the link retaining mechanism is crossed with the first long link of the first joint cross linkage of the link retaining mechanism, and a second joint cross linkage including a first short link having first and second end portions, a first long link having first and second end portions and longer than the first short link of the second joint cross linkage of the link retaining mechanism, the first short and long links of the second joint cross linkage of the link retaining mechanism pivotably connected with each other at the second end portion of the first short link of the second joint cross linkage of the link retaining mechanism and the first end portion of the first long link of the second joint cross linkage of the link retaining mechanism, a second short link having first and second end portions and substantially equal in length to the first short link of the second joint cross linkage of the link retaining mechanism, the first long link of the second joint cross linkage of the link retaining mechanism and the second short link of the second joint cross linkage of the link retaining mechanism pivotably connected with each other at the second end portion of the first long link of the second joint cross linkage of the link retaining mechanism and the first end portion of the second short link of the second joint cross linkage of the link retaining mechanism, and a second long link having first and second end portions and substantially equal in length to the first long link of the second joint cross linkage of the link retaining mechanism, the second short and long links of the second joint cross linkage of the link retaining mechanism pivotably connected with each other at the second end portion of the second short link of the second joint cross linkage of the link retaining mechanism and the first end portion of the second long link of the second joint cross linkage of the link retaining mechanism, the second long link of the second joint cross linkage of the link retaining mechanism and the first short link of the second joint cross linkage of the link retaining mechanism pivotably connected with each other at the second end portion of the second long link of the second joint cross linkage of the link retaining mechanism and the first end portion of the first short link of the second joint cross linkage of the link retaining mechanism under the

state that the second long link of the second joint cross linkage of the link retaining mechanism is crossed with the first long link of the second joint cross linkage of the link retaining mechanism, the length ratio of each of the first and second short links of the first joint cross linkage of the link retaining mechanism to each of the first and second long links of the first joint cross linkage of the link retaining mechanism substantially equal to the length ratio of each of the first and second short links of the second joint cross linkage of the link retaining mechanism to each of the first and second long links of the second joint cross linkage of the link retaining mechanism, the first short link of the first joint cross linkage of the link retaining mechanism integrally formed with and in parallel relationship with the first long link of the second joint cross linkage of the link retaining mechanism under the state that the second end portion of the first short link of the first joint cross linkage of the link retaining mechanism is connected with the first end portion of the first long link of the second joint cross linkage of the link retaining mechanism, the first long link of the first joint cross linkage of the link retaining mechanism integrally formed with and in parallel relationship with the first short link of the second joint cross linkage of the link retaining mechanism under the state that the first end portion of the first long link of the first joint cross linkage of the link retaining mechanism is connected with the second end portion of the first short link of the second joint cross linkage of the link retaining mechanism, the first end portion of any one of the first and second arm links integrally formed with the second short link of the first joint cross linkage of the link retaining mechanism, the first end portion of the other one of the first and second arm links integrally formed with the second long link of the second joint cross linkage of the link retaining mechanism; and a robot arm driving mechanism for driving the robot arm.

Paragraph beginning at page 7, line 2 has been amended as follows:

The link retaining mechanism 200 pivotably retains the first and second arm links 811 and 812 respectively at the first end portions of the first and second arm links 811 and 812 and keeps parallel two lines including a line passing through the first and second portions of the first arm link 811 and a line symmetrical with respect to the center line 201 with the line passing through the first and second portions of the second arm link 812. In fact the first and second arm links 811 and 812 are in symmetrical relationship with each other with respect to the center line

A₃ 201.

Paragraph beginning at page 12, line 26 has been amended as follows:

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The link retaining mechanism 200 pivotably retains the first and second arm links 821 and 822 respectively at the first end portions of the first and second arm links 821 and 822 and keeps parallel two lines including a line passing through the first and second portions of the first arm link 821 and a line symmetrical with respect to the center line 201 with the line passing through the first and second portions of the second arm link 822. The first end portion of the first arm link 821 is integrally formed with the second short link 213. The first end portion of the second arm link 822 is integrally formed with the second long link 224. The first end portions of the first and second arm links 821 and 822 are positioned on the center line 201. In fact the first and second arm links 821 and 822 are in symmetrical relationship with each other with respect to the center line 201.

Paragraph beginning at page 15, line 25 has been amended as follows:

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The link retaining mechanism 300 pivotably retains the first and second arm links 831 and 832 respectively at the first end portions of the first and second arm links 831 and 832 and keeps parallel two lines including a line passing through the first and second portions of the first arm link 831 and a line symmetrical with respect to the center line 301 with the line passing through the first and second portions of the second arm link 832.

Paragraph beginning at page 20, line 7 has been amended as follows:

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The link retaining mechanism 350 pivotably retains the first and second arm links 851 and 852 respectively at the first end portions of the first and second arm links 851 and 852 and keeps parallel two lines including a line passing through the first and second end portions of the first arm link 851 and a line symmetrical with respect to the center line 351 with the line passing through the first and second end portions of the second arm link 852.

Paragraph beginning at page 23, line 17 has been amended as follows:

A7 The robot arm 880 further comprises a fifth arm link 885 having first and second end portion, a sixth arm link 886 having first and second end portion, and an additional link retaining mechanism 250 having an additional center line 251. The additional link retaining mechanism 250 pivotably retains the fifth and sixth arm links 885 and 886 respectively at the first end portions of the fifth and sixth arm links 885 and 886 and keeps parallel two lines including a line passing through the first and second end portions of the fifth arm link 885 and a line symmetrical with respect to the additional center line 251 with the line passing through the first and second end portions of the sixth arm link 886. In fact the fifth and sixth arm links 885 and 886 are in symmetrical relationship with each other with respect to the center line 251.

Paragraph beginning at page 26, line 11 has been amended as follows:

A8 The link retaining mechanism 400 pivotably retains the first and second arm links 891 and 892 respectively at the first end portions of the first and second arm links 891 and 892 and keeps parallel two lines including a line passing through the first and second end portions of the first arm link 891 and a line symmetrical with respect to the center line 401 with the line passing through the first and second end portions of the second arm link 892. In fact the first and second arm links 891 and 892 are in symmetrical relationship with each other with respect to the center line 401.

Paragraph beginning at page 29, line 28 has been amended as follows:

A9 The link retaining mechanism 500 pivotably retains the first and second arm links 901 and 902 respectively at the first end portions of the first and second arm links 901 and 902 and keeps parallel two lines including a line passing through the first and second end portions of the first arm link 901 and a line symmetrical with respect to the center line 501 with the line passing through the first and second end portions of the second arm link 902. In fact the first and second arm links 901 and 902 are in symmetrical relationship with each other with respect to the center line 501.

Paragraph beginning at page 35, line 37 has been amended as follows:

A₁₀ The robot arm 930 further comprises an additional link retaining mechanism 450 having an additional center line 451. The additional link retaining mechanism 450 pivotably retains the fifth and sixth arm links 935 and 936 respectively at the first end portions of the fifth and sixth arm links 935 and 936 and keeps parallel two lines including a line passing through the first and second end portions of the fifth arm link 935 and a line symmetrical with respect to the additional center line 451 with the line passing through the first and second end portions of the sixth arm link 936. In fact the fifth and sixth arm links 935 and 936 are in symmetrical relationship with each other with respect to the additional center line 451.

Paragraph beginning at page 38, line 28 has been amended as follows:

A₁₁ The robot arm 940 further comprises an additional link retaining mechanism 450 having an additional center line 451. The additional link retaining mechanism 450 pivotably retains the fifth and sixth arm links 945 and 946 respectively at the first end portions of the fifth and sixth arm links 945 and 946 and keeps parallel two lines including a line passing through the first and second end portions of the fifth arm link 945 and a line symmetrical with respect to the additional center line 451 with the line passing through the first and second end portions of the sixth arm link 946. In fact the fifth and sixth arm links 945 and 946 are in symmetrical relationship with each other with respect to the additional center line 451.

Paragraph beginning at page 40, line 18 has been amended as follows:

A₁₂ The robot arm 950 further comprises a fifth arm link 955 having first and second end portion and a sixth arm link 956 having first and second end portion. The robot arm 950 further comprises an additional link retaining mechanism 450 having an additional center line 451. The additional link retaining mechanism 450 pivotably retains the third and fourth arm links 953 and 954 respectively at the first end portions of the third and fourth arm links 953 and 954 and keeps parallel two lines including a line passing through the first and second end portions of the third arm link 953 and a line symmetrical with respect to the additional center line 451 with the line